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Non-minimal pp-wave Einstein-Yang-Mills-Higgs model: Color cross-effects induced by curvature

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Abstract

Non-minimal interactions in the pp-wave Einstein-Yang-Mills-Higgs (EYMH) model are shown to give rise to color cross-effects analogous to the magneto-electricity in the Maxwell theory. In order to illustrate the significance of these color cross-effects, we reconstruct the effective (associated, color, and color-acoustic) metrics for the pp-wave non-minimal seven-parameter EYMH model with parallel gauge and scalar background fields. Then these metrics are used as hints for obtaining explicit exact solutions of the non-minimally extended Yang-Mills and Higgs equations for the test fields propagating in the vacuum interacting with curvature. The influence of the non-minimal coupling on the test particle motion is interpreted in terms of the so-called trapped surfaces, introduced in the Analog Gravity theory. © 2008 Springer Science+Business Media, LLC.

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Keywords

Effective metrics, Einstein-Yang-Mills-Higgs model, Non-minimal coupling, Pp-wave model